

We claim:

1. A method for producing an acid coated drinking straw or an acid coated confectionery article comprising the steps of:
  - (a) heating a food grade acid composition to a temperature sufficient for the acid composition to become fluid;
  - (b) applying the fluid acid composition from step (a) to a surface of a drinking straw or confectionery substrate; and
  - (c) cooling the acid composition coated drinking straw or acid coated confectionery substrate from step (b) to a temperature sufficient to immobilize the acid composition on the surface.
2. The method of claim 1, wherein the acid composition comprises a food grade acid selected from the group consisting of citric acid, adipic acid, fumaric acid, acetic acid, ascorbic acid, gluconolactone, phosphoric acid, hydrochloric acid, sulfuric acid, malic acid, tartaric acid, tannic acid, succinic acid, lactic acid, and mixtures thereof.
3. The method of claim 1, wherein the acid composition comprises a food grade acid selected from the group consisting of citric acid, phosphoric acid, malic acid, and mixtures thereof.
4. The method of claim 1, further comprising, prior to step (a), the step of preparing a food grade acid composition comprising about 40 to about 99.99 weight percent food grade acid, about 0.01 to about 5 weight percent surface tension reducing agent, 0 to about 30 weight percent plasticizer, 0 to about 20 weight percent bulk agent, and 0 to about 30 weight percent water.
5. The method of claim 4, wherein the acid composition comprises about 79 to about 99 weight percent food grade acid, about 0.01 to about 1 weight percent surface tension reducing agent, about 0.2 to about 5 weight percent plasticizer, and about 0.79 to about 15 weight percent water.

6. The method of claim 4, wherein the acid composition comprises about 88 to about 98 weight percent food grade acid, about 0.01 to about 0.5 weight percent surface tension reducing agent, about 0.2 to about 1 weight percent plasticizer, and about 1.79 to about 10.5 weight percent water.
7. The method of claim 4, wherein the food grade acid is selected from the group consisting of citric acid, adipic acid, fumaric acid, acetic acid, ascorbic acid, gluconolactone, phosphoric acid, hydrochloric acid, sulfuric acid, malic acid, tartaric acid, tannic acid, succinic acid, lactic acid, and mixtures thereof.
8. The method of claim 4, wherein the food grade acid is selected from the group consisting of citric acid, phosphoric acid, malic acid, and mixtures thereof.
9. The method of claim 4, wherein the surface tension reducing agent is a wetting agent, an emulsifier, or a surfactant.
10. The method of claim 4, wherein the surface tension reducing agent is selected from the group consisting of monoglycerides, diglycerides, acetylated monoglycerides, propylene glycol esters, lecithin, diacetyl tartaric acid esters of monoglycerides, glycerol esters, sodium dioctyl sulfosuccinate, polyglycerol esters, polysorbates, sodium stearyl-2-lactylate, sorbitan esters, sugar esters, and mixtures thereof.
11. The method of claim 4, wherein the surface tension reducing agent comprises a monoglyceride.
12. The method of claim 4, wherein the plasticizer is selected from the group consisting of glycerin, sorbitol, propylene glycol, maltitol, mannitol, and mixtures thereof.
13. The method of claim 4, wherein the plasticizer comprises glycerin.

14. The method of claim 4, wherein the bulk agent is selected from the group consisting of cellulose fibers, hydrocolloids, low molecular weight carbohydrates, food grade colloidal silicas, and mixtures thereof.
15. The method of claim 1, further comprising, prior to step (a), the step of preparing a food grade acid composition comprising about 40 to 100 weight percent food grade acid, 0 to about 5 weight percent surface tension reducing agent, 0 to about 30 weight percent plasticizer, 0 to about 20 weight percent bulk agent, and 0 to about 30 weight percent water.
16. The method of claim 1, wherein the application of the fluid acid composition in step (b) occurs by co-extrusion during manufacture of the drinking straw.
17. The method of claim 1, wherein the application of the fluid acid composition in step (b) is by spraying the fluid acid composition onto the drinking straw or confectionery substrate.
18. The method of claim 1, wherein the application of the fluid acid composition in step (b) is by dipping the drinking straw or confectionery substrate into the fluid acid composition or by passing the drinking straw or confectionery substrate through a curtain coater.
19. The method of claim 1, wherein the steps are applied to a drinking straw.
20. The method of claim 19, wherein the surface of the drinking straw is the interior surface of the drinking straw.
21. The method of claim 19, wherein the acid coated drinking straw has an acid dosage loading of about 50 to about 5000 milligrams acid per straw.
22. The method of claim 19, wherein the acid dosage loading is from about 100 to about 1000 milligrams per straw.

23. The method of claim 19, wherein the acid dosage loading is from about 200 to about 700 milligrams per straw.
24. The method of claim 1, wherein the steps are applied to a confectionery substrate.
25. The method of claim 24, wherein the confectionery substrate is selected from the group consisting of candies, chewing gums, drink stirrers, spoons, tongue depressors, plastic structures, cereals, popcorn, fruits, and nuts.
26. The method of claim 1, further comprising applying a secondary coating onto the immobilized acid coating following step (c).
27. The method of claim 26, wherein the secondary coating is formed by contacting a powdered ingredient onto the surface of the immobilized acid coating.
28. The method of claim 27, wherein the powdered ingredient is selected from the group consisting of food acids, sugars, fizzing agents, colorants, probiotics, vitamins, herbs, and flavoring agents.
29. A method for producing an acid coated drinking straw having a surface comprising the steps of:
- (a) preparing a food grade acid composition comprising about 88 to about 98 weight percent food grade acid, about 0.01 to about 0.5 weight percent surface tension reducing agent, about 0.2 to about 1 weight percent plasticizer, and about 1.79 to about 10.5 weight percent water;
  - (b) heating the acid composition to a temperature sufficient for the acid composition to become fluid;
  - (c) applying the fluid acid composition from step (b) to a surface of the drinking straw; and
  - (d) cooling the acid composition coated drinking straw from step (c) to a temperature sufficient to immobilize the acid composition on the surface.

30. The method of claim 29, wherein the acid coated drinking straw has an acid dosage loading of about 50 to about 5000 milligrams of food grade acid per straw.
31. The method of claim 29, wherein the food grade acid comprises a mixture comprising two or more of citric acid, phosphoric acid, or malic acid.
32. A method for forming a self-adherent acid coating on a substrate comprising the steps of:
- (a) heating a composition which comprises a mixture of two or more food grade acids, to form a molten fluid acid mixture;
  - (b) applying a coating of the molten fluid acid mixture from step (a) onto a surface of a solid substrate; and
  - (c) cooling the coated substrate from step (c) to a temperature sufficient to immobilize the acid mixture on the surface of the solid substrate.
33. The method of claim 32, wherein the substrate in step (b) is a polymeric tube.
34. The method of claim 33, wherein application of the coating in step (b) is by spraying the molten fluid acid mixture onto the interior surface of the tube as the tube is extruded.
35. The method of claim 34, wherein the cooling in step (c) occurs by submerging the tube in cooling water.
36. The method of claim 34, wherein during or following step (c), the tube is stretched and cut into drinking straws.
37. The method of claim 32, wherein the substrate is selected from the group consisting of candies, chewing gums, drink stirrers, spoons, tongue depressors, plastic structures, cereals, popcorn, fruits, and nuts.

38. An acid coated article for imparting flavor to a user comprising:  
a coating carrier comprising a drinking straw or a confectionery substrate; and  
an immobilized food grade acid composition coated onto a surface of the coating carrier for imparting an acidic flavor,  
wherein the acid composition coating is formed by heating the acid composition sufficient for the acid composition to become fluid, applying the fluid acid composition to the surface, and then cooling the acid composition sufficiently to immobilize the acid composition on the surface of the coating carrier.
39. The coated article of claim 38, wherein the acid composition comprises an acid selected from the group consisting of citric acid, adipic acid, acetic acid, ascorbic acid, fumaric acid, gluconolactone, phosphoric acid, hydrochloric acid, sulfuric acid, malic acid, tartaric acid, tannic acid, succinic acid, lactic acid, and mixtures thereof.
40. The coated article of claim 38, wherein the acid composition comprises an acid selected from the group consisting of citric acid, phosphoric acid, malic acid, and mixtures thereof.
41. The coated article of claim 38, wherein the coating carrier is drinking straw comprising an elongated drinking tube having an interior surface and an exterior surface and formed of a fluid impermeable material.
42. The coated article of claim 41, wherein the drinking straw has an acid dosage loading of about 50 to about 5000 milligrams acid per straw.
43. The coated article of claim 41, wherein the drinking straw has an acid dosage loading is from about 100 to about 1000 milligrams per straw.
44. The coated article of claim 41, wherein the drinking straw has an acid dosage loading is from about 200 to about 700 milligrams per straw.

45. The coated article of claim 41, wherein the interior surface of the drinking tube is coated with the acid composition.
46. The coated article of claim 38, wherein the acid composition comprises about 40 to about 99.99 weight percent food grade acid, about 0.01 to about 5 weight percent surface tension reducing agent, 0 to about 30 weight percent plasticizer, 0 to about 20 weight percent bulk agent, and 0 to about 30 weight percent water.
47. The coated article of claim 46, wherein the food grade acid is selected from the group consisting of citric acid, adipic acid, acetic acid, ascorbic acid, fumaric acid, gluconolactone, phosphoric acid, hydrochloric acid, sulfuric acid, malic acid, tartaric acid, tannic acid, succinic acid, lactic acid, and mixtures thereof.
48. The coated article of claim 46, wherein food grade acid is selected from the group consisting of citric acid, phosphoric acid, malic acid and mixtures thereof.
49. The coated article of claim 46, wherein the surface tension reducing agent is a wetting agent, an emulsifier, or a surfactant.
50. The coated article of claim 46, wherein the surface tension reducing agent is selected from the group consisting of monoglycerides, diglycerides, acetylated monoglycerides, propylene glycol esters, lecithin, diacetyl tartaric acid esters of monoglycerides, glycerol esters, sodium dioctyl sulfosuccinate, polyglycerol esters, polysorbates, sodium stearyl-2-lactylate, sorbitan esters, sugar esters, and mixtures thereof.
51. The coated article of claim 46, wherein the surface tension reducing agent comprises monoglyceride.

52. The coated article of claim 46, wherein the plasticizer is selected from the group consisting of glycerin, sorbitol, propylene glycol, maltitol, mannitol, and mixtures thereof.

53. The coated article of claim 46, wherein the plasticizer comprises glycerin.

54. The coated article of claim 46, wherein the bulk agent is selected from the group consisting of cellulose fibers, hydrocolloids, low molecular weight carbohydrates, food grade colloidal silicas, and mixtures thereof.

55. The coated article of claim 38, wherein the acid composition comprises about 79 to about 99 weight percent food grade acid, about 0.01 to about 1 weight percent surface tension reducing agent, about 0.2 to about 5 weight percent plasticizer, and about 0.79 to about 15 weight percent water.

56. The coated article of claim 55, wherein food grade acid is selected from the group consisting of citric acid, phosphoric acid, malic acid, and mixtures thereof.

57. The coated article of claim 55, wherein the surface tension reducing agent is selected from the group consisting of monoglycerides, diglycerides, acetylated monoglycerides, propylene glycol esters, lecithin, diacetyl tartaric acid esters of monoglycerides, glycerol esters, sodium dioctyl sulfosuccinate, polyglycerol esters, polysorbates, sodium stearyl-2-lactylate, sorbitan esters, sugar esters, and mixtures thereof.

58. The coated article of claim 55, wherein the plasticizer is selected from the group consisting of glycerin, sorbitol, propylene glycol, maltitol, mannitol, and mixtures thereof.



59. The coated article of claim 35, wherein the acid composition comprises about 88 to about 98 weight percent food grade acid, about 0.01 to about 0.5 weight percent surface tension reducing agent, about 0.2 to about 1 weight percent plasticizer, and about 1.79 to about 10.5 weight percent water.

60. The coated article of claim 59, wherein food grade acid is selected from the group consisting of citric acid, phosphoric acid, malic acid, and mixtures thereof.

61. The coated article of claim 59, wherein the surface tension reducing agent is selected from the group consisting of monoglycerides, diglycerides, acetylated monoglycerides, propylene glycol esters, lecithin, diacetyl tartaric acid esters of monoglycerides, glycerol esters, sodium dioctyl sulfosuccinate, polyglycerol esters, polysorbates, sodium stearyl-2-lactylate, sorbitan esters, sugar esters, and mixtures thereof, and wherein the plasticizer is selected from the group consisting of glycerin, sorbitol, propylene glycol, maltitol, mannitol, and mixtures thereof.

62. The coated article of claim 38, wherein the food grade acid composition comprises about 40 to 100 weight percent food grade acid, 0 to about 5 weight percent surface tension reducing agent, 0 to about 30 weight percent plasticizer, 0 to about 20 weight percent bulk agent, and 0 to about 30 weight percent water.

63. The coated article of claim 38, wherein the coating carrier is a confectionery substrate.

64. The coated article of claim 63, wherein the confectionery substrate is selected from the group consisting of candies, chewing gums, drink stirrers, spoons, tongue depressors, plastic structures, cereals, popcorn, fruits, and nuts.

65. The coated article of claim 38, further comprising a secondary coating which is coated onto the food acid composition coating.

66. The coated article of claim 65, wherein the secondary coating comprises a powdered ingredient adhered onto the surface of the food acid composition coating.

67. The coated article of claim 66, wherein the powdered ingredient is selected from the group consisting of food acids, sugars, fizzing agents, colorants, probiotics, vitamins, herbs, and flavoring agents.

68. An acid coated drinking straw comprising:

an elongated drinking tube having an interior surface and an exterior surface and formed of a fluid impermeable material; and

a food grade acid composition coated on at least one of the surfaces for imparting an acidic flavor,

wherein the acid composition comprises about 88 to about 98 weight percent food grade acid, about 0.01 to about 0.5 weight percent surface tension reducing agent, about 0.2 to about 1 weight percent plasticizer, and about 1.79 to about 10.5 weight percent water.

69. The acid coated drinking straw of claim 68, wherein the acid composition coating is applied by heating an acid composition to a temperature sufficient for the acid composition to be fluid, applying the fluid acid composition onto the at least one of the surfaces, and then cooling the composition to immobilize the acid composition on the at least one of the surfaces, thereby forming the coating which self-adheres to the at least one of the surface of the drinking straw.

70. The acid coated drinking straw of claim 68, which has an acid dosage loading of about 50 to about 5000 milligrams acid per straw.

71. The acid coated drinking straw of claim 68, wherein the food grade acid comprises a mixture comprising two or more of citric acid, phosphoric acid, or malic acid.

72. An acid coated drinking straw comprising:  
an elongated drinking tube having an interior surface and formed of a fluid impermeable material; and  
a food grade acid composition coated on the interior surface,  
wherein the acid composition comprises about 88 to about 98 weight percent food grade acid selected from the group consisting of citric acid, adipic acid, acetic acid, ascorbic acid, fumaric acid, gluconolactone, phosphoric acid, hydrochloric acid, sulfuric acid, malic acid, tartaric acid, tannic acid, succinic acid, lactic acid and mixtures thereof; about 0.01 to about 0.5 weight percent surface tension reducing agent selected from the group consisting of monoglycerides, diglycerides, acetylated monoglycerides, propylene glycol esters, lecithin, diacetyl tartaric acid esters of monoglycerides, glycerol esters, sodium dioctyl sulfosuccinate, polyglycerol esters, polysorbates, sodium stearyl-2-lactylate, sorbitan esters, sugar esters and mixtures thereof; about 0.2 to about 1 weight percent plasticizer selected from the group consisting of glycerin, sorbitol, propylene glycol, maltitol, mannitol and mixtures thereof; and about 1.79 to about 10.5 weight percent water.
73. The acid coated drinking straw of claim 72, wherein the food grade acid is selected from citric acid, phosphoric acid, malic acid and mixtures thereof; the surface tension reducing agent is monoglyceride; and the plasticizer is glycerin.
74. The acid coated drinking straw of claim 72, which has an acid dosage loading of about 50 to about 5000 milligrams acid per straw.

75. A beverage kit of parts comprising:
- a container comprising beverage; and
  - at least one acid coated drinking straw suitable for insertion into the container and for imparting an acid flavor to the beverage when drinking the beverage through the straw, wherein the drinking straw comprises a food grade acid composition coated on the interior surface of the drinking straw.
76. The beverage kit of claim 75, wherein the beverage comprises a fruit juice or fruit flavored drink.